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ABSTRACT

Building upon earlier confirmatory factor analytic research that validated a second-order, three-factor structure of the Beck Depression Inventory for Canadian and Swedish nonclinical adolescents, this study tested the factorial structure of the Swedish version of the instrument separately for 559 males and 537 females, and tested its measurement and structural equivalence across gender. Except for three minor discrepancies involving correlated errors, the hypothesized model best described the data for both males and females. Nonetheless, the imposition of equality constraints across sex revealed differences bearing on the measurement of six items, and latent construct relations involving the Somatic Elements factor. Four gender differences in factorial structure replicated findings for Canadian adolescents. Results have important implications for researchers, clinicians, and others whose interests focus on nonclinical adolescent depression. (Contains 35 references, 2 tables, and 1 figure.) (Author/SLD)

Testing for a Gender-invariant Hierarchical Structure of Depression for Swedish Adolescents

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Abstract

Building upon earlier confirmatory factor analytic research that validated a 2nd-order 3-factor structure of the Beck Depression Inventory for Canadian and Swedish nonclinical adolescents, the purposes of the present study were twofold: (a) to test the factorial structure of the Swedish version of the instrument separately for males (n=559) and females (n=537), and (b) to test for its measurement and structural equivalence across gender. Except for three minor discrepancies involving correlated errors, the hypothesized model best described the data for both males and females. Nonetheless, the imposition of equality constraints across sex revealed differences bearing on the measurement of six items, and latent construct relations involving the Somatic Elements factor. Four gender differences in factorial structure replicated findings for Canadian adolescents. Results have important implications for researchers, clinicians, and others whose interests focus on nonclinical adolescent depression.

Measuring Depression for Swedish Nonclinical Adolescents: Factorial Validity and Equivalence of the Beck Depression Inventory Across Gender

Adolescent depression, particularly as it relates to the nonclinical population, is becoming of increasing concern to educational psychologists, clinicians, and researchers alike (Reynolds, 1992). Although there are now several assessment tools designed to measure aspects of adolescent depression (see Compas, Ey, & Grant, 1993), the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) has tended to be the most widely used, despite its original development for use with clinical samples. However, while the number of substantive studies in this area has grown rapidly over the past few years (see e.g., Petersen, Compas, Brooks-Gunn, Stemmler, Ey, & Grant, 1993), those focusing on the validity of the BDI for use with nonclinical adolescents have been few (Baron and Laplante 1984; Larsson and Melin 1990; Shek 1990; Teri 1982). Indeed, until the recent work of Byrne and Baron (1993a, 1993b), the factor structure of this instrument had not been tested statistically; all previous factor analytic research had used only exploratory procedures that were incapable of doing so. (For an elaboration of the limitations of exploratory factor analyses, see e.g., Bollen, 1989; Byrne, Baron, & Campbell, 1993). Addressing this limitation, Byrne and Baron (1993a, 1993b) used confirmatory factor analyses (CFAs) and reported a 2nd-order factor structure which replicated across three independent samples of Canadian adolescents, and more recently, across three independent samples of Swedish adolescents (Byrne, Baron, Larsson, & Melin, 1994).

With particular reference to assessment instruments, exploratory factor analysis (EFA) is used appropriately when the underlying factor structure of the measure is unknown or uncertain. The researcher thus proceeds in an exploratory mode to determine (a) the minimal number of factors that underlie (i.e., account for variation among) the observed item data, and (b) the pattern by which the items are linked to the underlying factors (i.e., latent constructs). This factor analytic approach is regarded as exploratory in the sense that the researcher has no prior knowledge that the items do indeed measure the intended factors. In contrast, CFA addresses the situation where the researcher wishes to test the hypothesis that a particular linkage between items and underlying factors does in fact exist. Drawing on knowledge of the theory, empirical research, or both, he or she postulates the linkage pattern a priori and then tests this hypothesis statistically. (For an elaboration of the comparison between EFA and CFA, see Bollen, 1989; Byrne, 1994).

Much of the substantive research bearing on nonclinical adolescent depression has focused on gender differences related both to the prevalence (e.g., Allgood-Merten, Lewinsohn, & Hops, 1990; Baron & Perron, 1986; Larsson & Melin, 1990; Larsson, Melin, Breitholtz, & Andersson, 1991; Webb & VenDevere, 1985; for reviews, see Nolen-Hoeksema, 1987; Petersen et al., 1993) and expression (e.g., Baron & Campbell, 1991; Baron & Joly, 1988; Campbell, Byrne, & Baron, 1992) of depressive symptoms. Implicit in such multigroup comparisons, however, is the assumption that the measuring instrument is factorially invariant across gender. More specifically, it assumes the equivalency of the assessment measure with respect to (a) number of underlying depression factors, (b) pattern of factor loadings (i.e., items designed to measure a particular factor of depression are consistent in doing so across males and females, (c) item measurements (i.e., all item content is equivalently interpreted by males and females), and (d) theoretical structure of depression (i.e., pattern and magnitude of relations among the underlying factors is the same across males and females). Despite the risk that noninvariance of a measuring instrument across groups can seriously erode the credibility of the study findings, such information is most often assumed in substantive multigroup research but rarely, if ever, is it directly tested.

Addressing this issue, Byrne, Baron, & Campbell (1993, 1994) tested these equality assumptions across Canadian adolescent males and females as they related to 2nd-order models of factor structure for both the English and French versions of the BDI, respectively. Except for a few subtle differences, they reported this hierarchical structure to be factorially invariant across gender. Since findings related to the English version are most relevant to the present study, only these are reviewed here. Overall, while the initially hypothesized model (taken from Byrne and Baron, 1993a) represented an excellent fit to the data for males, it was less so for females. Post hoc model fitting yielded two important model reparameterizations for females. First, whereas Item 20 (hypochondria) loaded onto the Performance Difficulty factor for males, it was found to load more adequately on Negative Attitude for females. Second, an error covariance between Items 20 (hypochondria) and 21 (libido loss) was shown to be highly significant for females; on the basis of sound substantive justification, this parameter was subsequently incorporated into the female model. One final gender difference in the postulated model was the finding that the factor loading for Item 19 (weight loss) was not significant for females.

This earlier CFA work of Byrne and Baron (1993a, 1993b; Byrne et al., 1993, 1994) suggests that, although the underlying factor structure of the BDI appears to be most adequately represented by a higher-order structure that includes three 1st-order factors (Negative Attitude, Performance Difficulty, Somatic Elements) and one 2nd-order factor of General Depression, there is some evidence of slight gender differences in the interpretation of BDI items.

Based on three independent samples of Swedish nonclinical adolescents, and using a Swedish version of the BDI (BDI-SW), Byrne, Baron, Larsson, and Melin (1994) recently tested the validity of the 2nd-order factor structure reported by Byrne and Baron (1993a). Except for minor discrepancies in fit that included correlated errors and one cross-loading (i.e., loading of one item on two different factors) for one group, findings supported those reported by Byrne and Baron (1993a). Having determined that BDI-SW scores are most appropriately interpreted within the framework of a hierarchical factor structure for Swedish adolescents, the next logical step in the construct validation process is to determine whether this structure holds across groups. The present study addressed this issue by testing for the equivalence of a 2nd-order BDI-SW factor structure across adolescent males and females.

Method

Sample and Procedures

Combined data from an earlier study (Larsson & Melin, 1990) represented samples from three locales in Sweden (Uppsala, n=682; Gavle, n=262; countryside, n=200) and yielded BDI-SW responses from 1144 nonclinical adolescents. All subjects were high school students registered in the regular education program (grades 9-12); ages ranged from 13-18. Listwise deletion of data that were missing completely at random (see Muthen, Kaplan, & Hollis, 1987) resulted in a final sample size of 1096 (559 males; 537 females).

Following a brief description of the purpose of the study by two graduate students, the BDI was administered to the students in their classrooms during regular school hours. Responses to all items were completed anonymously.

Instrumentation

The BDI is a 21-item self-report scale that is used to measure depressed mood, along with other symptoms of depression in adolescence (Compas et al., 1993). More specifically, the instrument identifies symptoms related to cognitive, behavioral, affective, and somatic components of depression. Each item comprises four statements rated from 0 to 3 in terms of intensity, and respondents are asked to report the one which most accurately describes their own current feelings; high scores represent a more intense depression.

BDI scores comprising the present data were based on a Swedish translation of the original instrument which we refer to here as the BDI-SW; item content was cross-validated using three bilingual translators. Because we believed that for Swedish adolescents, Item 21 (libido loss) would be perceived as somewhat controversial, the content of this item was modified to read "Interest in boys/girls"; all other items remained intact.

Various translated versions of the BDI have reportedly yielded estimates of internal consistency reliability (coefficient α) for nonclinical adolescents ranging from .80 to .90 (mean α =.86; Baron & Laplante, 1984; Barrera & Garrison-Jones, 1988; Shek, 1990; Teri, 1982). Baron and Laplante (1984) reported a test-retest reliability of .74 (8 weeks) for the French-Canadian version of the instrument. Finally, Barrera and Garrison-Jones have demonstrated evidence of convergent validity with the Child Assessment Schedule (CAS; Hodges, Kline, Stern, Cytryn, & McKnew, 1982) for items measuring depression symptoms (r=.73) and with the General Self-worth subscale of the Perceived Competence Scale for Children (Harter, 1982; r=-.64); they also reported evidence of discriminant validity with CAS items measuring conduct disorder (r=.29) and anxiety (r=.29) symptoms.

The Hypothesized Model

The model to be tested across males and females is the final best-fitting model for the largest of the three Swedish samples tested by Byrne, Baron, Larsson, and Melin (1994); it is presented schematically in Figure 1.

Insert Figure 1 about here

Turning to Figure 1, we see an hierarchical ordering of circles such that if the page were turned sideways, the "Depression" circle would be on top, with the three smaller circles beneath it. We interpret this schema as representing one 2nd-order factor (Depression), and three 1st-order factors (Negative Attitude; Performance Difficulty; Somatic Elements). The single-headed arrows leading from the higher-order factor to each of the lower-order factors represent regression paths that indicate the causal impact of Depression on the Negative Attitude, Performance Difficulty, and Somatic Elements factors; they are the 2nd-order factor loadings. The angled arrow leading to each 1st-order factor represents residual error in their prediction from the higher-order factor of Depression. The single-headed arrows leading from each 1st-order factor to the boxes are regression paths that link each of the factors to their respective set of observed scores; these coefficients represent the 1st-order factor loadings. For example, Figure 1 postulates that Items 4, 11, 12, and so on, load onto the Performance Difficulty factor. The single-headed arrow pointing to each box represents observed measurement error associated with the item variables. Finally, the double-headed arrows linking the three pairs of single-headed arrows represent error covariances.

One important omission in Figure 1 is the presence of double-headed arrows (↕'s) among the 1st-order factors thereby indicating their intercorrelation. This is because in 2nd-order factor analysis, all covariation among the 1st-order factors is considered to be explained by the 2nd-order factor.

Analysis of the Data

Tests for the factorial validity of the BDI-SW for males and females, and for its invariance across gender were based on the analysis of covariance structures within the framework of the CFA model. Analyses were conducted in two major stages using the EQS program (Bentler, 1992). First, CFA procedures were conducted separately for males and females to test for the validity of the hypothesized model shown in Figure 1. Presented with findings of inadequate fit, and sound statistical, empirical, and theoretical justification for doing so, the model was respecified to include additional parameters identified by the Lagrange Multiplier Test (LM-Test) as those that would contribute most to a significantly better-fitting model. Second, bearing in mind the issue of partial measurement invariance (Byrne, Shavelson, & Muthen, 1989), the best-fitting model for adolescent males and females was tested for its equivalence across gender.

Several criteria were used in the assessment of model fit; these were: (a) the χ^2 likelihood ratio statistic, (b) the Comparative Fit Index (CFI; Bentler, 1990); a value >.90 indicates a psychometrically acceptable fit to the data, (c) the Satorra-Bentler Scaled Statistic (S-Bχ^2; Satorra & Bentler, 1988) which incorporates a scaling correction for the χ^2 statistic when distributional assumptions are violated, and (d) the substantive meaningfulness of the model (see MacCallum, 1986). Given the known kurtotic nature of particular BDI items for both English- and French speaking nonclinical adolescents (Byrne & Baron, 1993a, 1993b; Byrne et al., 1993, 1994), this statistic allows for a more cogent assessment of factorial validity than is possible with the uncorrected (i.e., biased) statistic. The corrected CFI value (CFI*) computed from the S-Bχ^2 statistic for the null model is also reported.

Results

Preliminary analyses identified one multivariate outlier for males, and one for females. Deletion of these cases resulted in final sample sizes of 558 and 536 for males and females, respectively. As expected, based on earlier analyses of these data, there was substantial evidence of multivariate positive kurtosis for both sexes; however, in contrast to the Canadian findings (Byrne et al., 1993), nonnormality was much more pronounced for females, than for males. Given the abnormally high degree of kurtosis associated with the present data, it was deemed critical that final assessment of statistical fit be based on the S-Bχ^2, and on its related CFI* value, both of which correct for this violation.

Stage 1: Test of the Hypothesized Model

As indicated by the CFI* values reported in Table 1, goodness-of-fit for the initially hypothesized model of BDI-SW structure was exceptionally good for males; it was less well-fitting for females. Moreover, whereas all estimated parameters were significant for females, the specified error covariance between Items 20 (hypochondria) and 21 (boy/girl interest) was not significant for males; this parameter was subsequently deleted in the final model. (For a detailed explanation of testing covariance structure models with accompanying examples, see Byrne, 1989, 1994.) We turn now to the problematic fit of the model for female adolescents.

Insert Table 1 about here

Examination of the multivariate LM χ^2 coefficients related to the initially hypothesized model for females revealed substantial improvement in model fit to be gained from the additional specification of error covariances between Items 2 (pessimism) and 4 (dissatisfaction), and between Items 5 (guilt) and 6 (punishment). Thus, this initial model was respecified to include these two parameters, and then reestimated.

To assess the extent to which a respecified model exhibits an improvement in fit, we examine the difference in χ^2 ($\Delta\chi^2$) between the two models. This differential is itself χ^2-distributed, with degrees of freedom equal to the difference in degrees of freedom (Δdf), and can thus be tested statistically; a significant $\Delta\chi^2$ indicates a substantial improvement in model fit. As shown in Table 1, incorporation of these two parameters into the model resulted in a statistically better-fitting model for adolescent females (ΔS-B$\chi^2_{(2)}$=21.99); the difference in CFI* values was also substantial (.04).

Stage 2: Tests for Equivalence Across Gender

The focus of these analyses was to test for the equivalence of common factor structure across adolescent males and females. It is important to note that, although the 2nd-order structure was found to be identical for each sex except for three correlated errors, this in no way guarantees their equivalence statistically. Based on the final model for each sex, then, all 1st- and 2nd-order factor loadings, as well as the originally specified error covariances (Items 16/17; Items 18/19) were put to the test statistically by constraining them to be equal across gender in a simultaneous analysis of the data. Adhering to caveats bearing on partial measurement invariance, (Byrne et al., 1989), the gender-specific error covariances between Items 2 and 4, and between Items 5 and 6 were left unconstrained across sex.

Judgment of gender invariance was based on two criteria: (a) goodness-of-fit of the constrained model, and (b) probability level of the equality constraints as determined by the LM-Test (equality constraints with $p<.05$ being untenable). Results from these analyses revealed a relatively poor fit to the constrained model ($\chi^2_{(390)}$=1132.76; CFI=.88)., with nine constraints not tenable across gender. These constrained parameters, and their associated univariate χ^2 and probability values are summarized in Table 2. Each χ^2 value represents the expected reduction in the overall model fit χ^2 value if the related equality constraint were released. (Readers interested in a more detailed explanation and application of invariance-testing procedures are referred to Byrne 1989, 1994.)

Insert Table 2 about here

As shown in Table 2, the four worst-fitting equality constraints involved three 1st-order loadings and one 2nd-order loading. The nonequivalence of 2nd-order factor loadings suggested that possibly structural relations among the lower-order factors were not the same for adolescent males and females. Indeed, such gender differences in latent construct relations have been found for the same population with respect to self-concept (see Byrne & Shavelson, 1987). In order to examine this possibility, the final model for each sex was reparameterized as a 1st-order model. These findings revealed that whereas the relation between Factors 1 (Negative Attitude) and 2 (Performance Difficulty) were virtually the same for both sexes (males, r=.83; females, r=.84), those remaining were widely discrepant. The correlation between Factors 1 and 3 (Somatic Elements) was .77 for males, and was .69 for females; between Factors 2 and 3, the correlation was .81 for males, and .94 for females.

Discussion

Consistent with previous tests of gender invariance related to the factor structure of the BDI for nonclinical adolescents (Byrne et al., 1993, 1994), findings from the present study have shown that although a higher-order structure of depression most adequately represented the data for both males and females, there were some gender differences related both to the fit of the model, and to the way the items operated across the two groups (i.e., measurement invariance). There are several interesting similarities between the present study and the one conducted on Canadian English data. First, as with the Canadian study, the hypothesized model was substantially better-fitting for males than it was for females. Second, in both studies, there was a highly significant error correlation between Items 20 (hypochondria) and 21 (boy/girl interest) for females, yet this parameter was not significant for males. Third, in both studies, a better-fitting model was attained for females through the incorporation of correlated errors associated with particular items. Finally, as with Canadian study, Item 19 (weight loss) was not significant for females, whereas it was highly significant for males. Three gender difference findings, however, lie in sharp contrast to the Canadian research. Of major import, was the nonequivalency of two 2nd-order and six 1st-order factor loadings; these reflect gender differences in the theoretical structure of the depression construct, and in the perception of item content, respectively. A second deviation from the Canadian results lies with the dramatic gender difference in the nonnormality of item scores for Swedish adolescents.

Of substantial import in this study is that not only were the data for both males and females most adequately represented by the 2nd-order factor structure proposed by Byrne, Baron, Larsson, & Melin (1994), but that gender differences related to the general pattern of structure tended to mirror those reported for Canadian adolescents (see Byrne et al., 1993). These replicated findings underscore the need to take gender into account in the interpretation of BDI scores. Although our construct validity work with the BDI is beginning to reap convergent findings related both to its factor structure, and to gender differences bearing upon such structure, further research is needed in order to test the validity of these findings within the context of other cultures. In particular, it would be interesting to determine the extent to which the gender differences found with Swedish adolescents hold across nonclinical adolescents in the other Scandinavian countries.

One may also question the link between depressive symptoms in nonclinical adolescents, and depression in clinical adolescents. Indeed, Reynolds (1993, p. 264) has argued for "a strong association between high levels of depressive symptomatology based on self-report and clinical interview severity measures, and formal diagnoses of mood disorders"; he therefore concluded that "the determination of a clinical level of depressive symptomatology is not mutually exclusive of a formal diagnosis of a mood disorder". Consonant with this perspective, Compas et al., (1993) proposed a hierarchical and sequential model that integrates depressive phenomena (symptoms, syndrome, disorder). According to their model, of the 15 to 40 percent of adolescents who show depressive symptoms during adolescence, five to six percent develop depressive syndromes, and one to three percent evolve towards a disorder condition. Nonetheless, this model suggests that whereas the manifestation of depressive symptoms is a function of daily stress, hormonal fluctuations, and interpersonal relations, the shift from symptoms to syndrome, and/or from syndrome to disorder, is driven by dysfunctional biological and adjustment/stress) processes. Compas et al. (1993, p. 326) emphasize that depressive symptoms carry "considerable clinical significance as a marker of distress when reported by adolescents".

Within this perspective, albeit irrespective of the as yet unresolved equation linking nonclinical and clinical adolescents, our results appear pertinent to the understanding of clinical depression in adolescents. Clearly, it is important that future research put this argument to the test by corroborating our present findings with clinical adolescent samples.

References

Allgood-Merten, B., Lewinsohn, P.M., & Hops, H. (1990). Sex differences and adolescent depression. Journal of Abnormal Psychology, 99, 55-63.

Baron, P. & Campbell, T.L. (September 1991). Differential depressive responding in middle adolescence. Poster presented at the Annual Meeting of the European Association for Behavior Therapy, Oslo, Norway.

Baron, P. & Joly, E. (1988). Sex differences in the expression of depression in adolescents. Sex Roles, 18, 1-7.

Baron, P., & Laplante, L. (1984). L'inventaire de Dépression de Beck: Son utilisation auprès d'un échantillon d'adolescents francophones. Revue de Modification du Comportement, 14, 161-166.

Baron, P., & Perron, L.M. (1986). Sex differences in the Beck Depression Inventory scores of adolescents. Journal of Youth and Adolescence, 15, 165-171.

Barrera, M. Jr., & Garrison-Jones, C.V. (1988). Properties of the Beck Depression Inventory as a screening measure for adolescent depression. Journal of Abnormal Child Psychology, 16, 263-273.

Beck, A.T., Ward, C.H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. Archives of General Psychiatry, 4, 561-571.

Bentler, P.M. (1990). Comparative fit indices in structural models. Psychological Bulletin, 107, 238-246.

Bentler, P.M. (1992). EQS: Structural Equations program manual. Los Angeles, CA: BMDP Statistical Software.

Bollen, K.A. (1989). Structural equations with latent variables. New York: Wiley.

Byrne, B.M. (1989). A primer of LISREL: Basic applications and programming for confirmatory factor analytic models. New York: Springer-Verlag.

Byrne, B.M. (1994). Structural equation modeling with EQS: Basic concepts, applications, and programming. Newbury Park, CA: Sage.

Byrne, B.M. & Baron, P. (1993a). The Beck Depression Inventory: Testing and cross-validating an hierarchical factor structure for nonclinical adolescents. Measurement and Development in Counseling and Development, 26, 164-178.

Byrne, B.M. & Baron, P. (1993b). Measuring adolescent depression: Tests of equivalent factorial structure for English and French versions of the Beck Depression Inventory. Applied Psychology: An International Review, 43, 33-47.

Byrne, B.M., Baron, P., & Campbell, T.L. (1993). Measuring adolescent depression: Factorial validity and invariance of the Beck Depression Inventory across gender. Journal of Research on Adolescence, 3, 127-143.

Byrne, B.M., Baron, P., & Campbell, T.L. (1994). The Beck Depression Inventory (French version): Testing for gender-invariant factorial structure for nonclinical adolescents. Journal of Adolescent Research, 9, 166-179.

Byrne, B.M., Baron, P., Larsson, B., & Melin, L. (1994). The Beck Depression Invent[illegible] Swedish nonclinical adolescents. Paper under review.

Byrne, B.M., & Shavelson, R.J. (1987). Adolescent self-concept: Testing the assumption of equivalent structure across gender. American Educational Research Journal, 24, 365-385.

Byrne, B.M., Shavelson, R.J., & Muthén, B. (1989). Testing for the equivalence of factor covariance and mean structures: The issue of partial measurement invariance. Psychological Bulletin, 105, 456-466.

Campbell, T.L., Byrne, B.M., & Baron, P. (1992). Gender differences in the expression of depressive symptoms in early adolescents. Journal of Early Adolescence, 12, 326-338.

Compas, B.E., Ey, S., & Grant, K.E. (1993). Taxonomy, assessment, and diagnosis of depression during adolescence. Psychological Bulletin, 114, 323-344.

Harter, S. (1982). The Perceived Competence Scale for Children. Child Development, 53, 87-97.

Hodges, K., Kline, J., Stern, L., Cytryn, L., & McKnew, D. (1982). The development of a child assessment interview for research and clinical use. Journal of Abnormal Child Psychology, 10, 173-189.

Larsson, B & Melin, L. (1990). Depressive symptoms in Swedish adolescents. Journal of Abnormal Child Psychology, 18, 91-103.

Larsson, B., Melin, L., Breitholtz, E., & Andersson, G. (1991). Short-term stability of depressive symptoms and suicide attempts in Swedish adolescents. Acta Psychiatrica Scandinavica, 83, 385-390.

MacCallum, R. (1986). Specification searches in covariance structure modeling. Psychological Bulletin, 100, 107-120.

Muthen, B., Kaplan, D., & Hollis, M. (1987). Structural equation modeling for data that are not missing completely at random. Psychometrika, 51, 431-462.

Nolen-Hoeksema, S. (1987). Sex differences in unipolar depression: Evidence and theory. Psychological Bulletin, 101, 259-282.

Petersen, A.C., Compas, B.E., Brooks-Gunn, J., Stemmler, M., Ey, S., & Grant, K.E. (1993). Depression in adolescence. American Psychologist, 48, 155-168.

Reynolds, W.M. (1992). Depression in children and adolescents. In W.M. Reynolds (Ed.), Internalizing disorders in children and adolescents (pp. 149-253). New York: Wiley.

Reynolds, W.M. (1993). Depression in adolescents: Contemporary issues and perspectives. In T.H. Ollendick & R.J. Prinz (Eds.), Advances in clinical child psychology (Vol. 16). (pp. 261-316). New York: Plenum.

Satorra, A. & Bentler, P.M. (1988). Scaling corrections for chi- square in covariance structure analysis. Proceedings of the American Statistical Association: 1988 Proceedings of the Business and Ecnomics Sections (pp. 308-313). Alexandria VA: American Statistical Association.

Shek, D.T.L. (1990). Reliability and factorial structure of the Chinese version of the Beck Depression Inventory. Journal of Clinical Psychology, 46, 35-43.

Teri, L, (1982). The use of the Beck Depression Inventory with adolescents. Journal of Abnormal Child Psychology, 10, 227-284.

Webb, T.E. & VanDevere, C.A. (1985). Sex differences in the expression of depression: A developmental interaction effect. Sex Roles, 12, 91-95.

Table 1

Summary of Fit Statistics for 2nd-order Models of BDI Factorial Structure Across Gender

Model	S-Bχ^2	df	CFI*
Adolescent Males			
Hypothesized Model	268.07	184	.94
Final Model	277.83	185	.94
• 2 correlated errors			
Adolescent Females			
Hypothesized Model	278.28	184	.86
Final Model	256.29	182	.90
• 5 correlated errors			

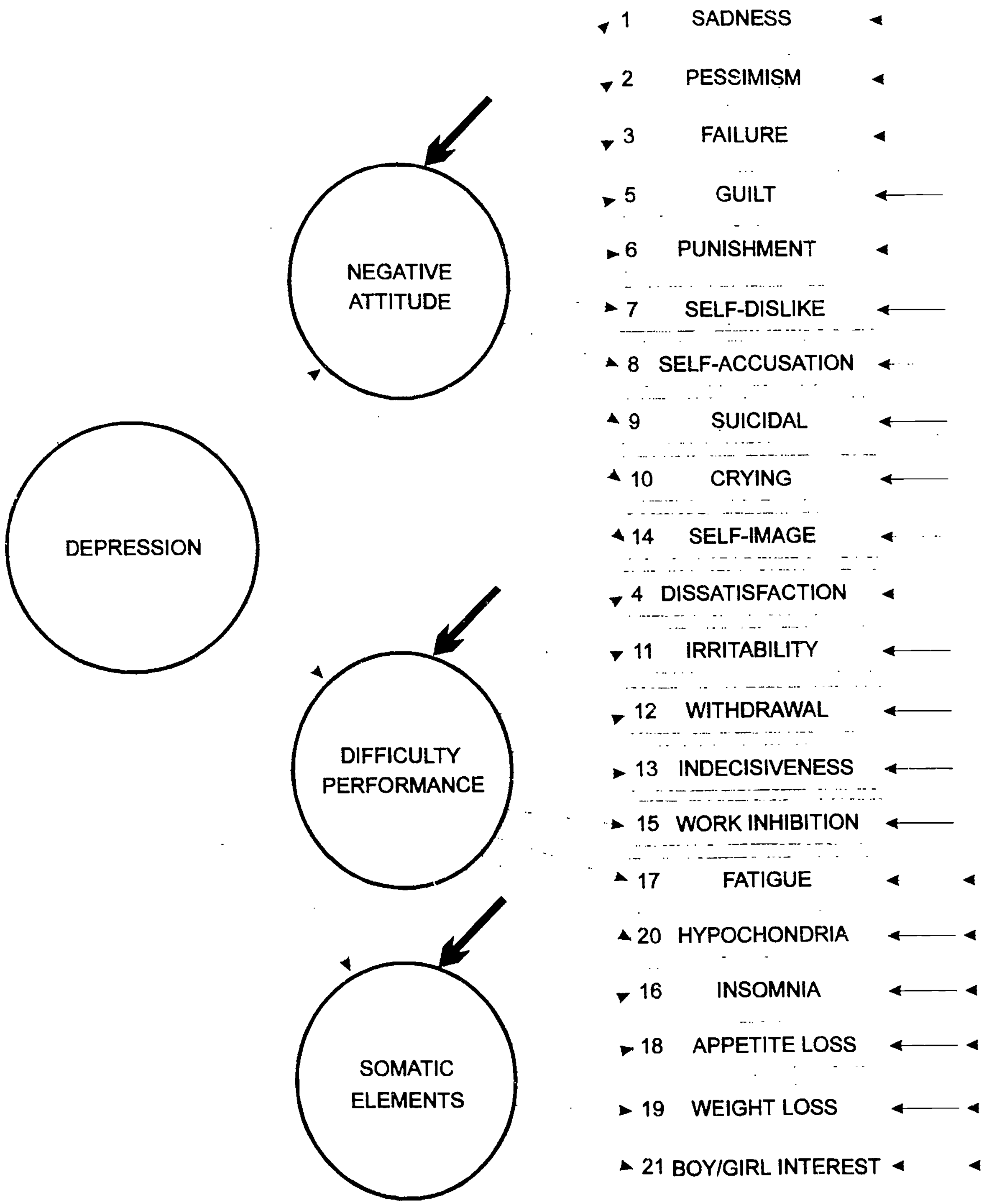
Table 2

Summary Statistics for Noninvariant Parameters Across Gender

Constrained Parameter	χ^2	Probability
First-order Factor Loadings		
Item 2 on Factor 1	13.83	.000
Item 5 on Factor 1	4.67	.031
Item 6 on Factor 1	17.04	.000
Item 7 on Factor 1	6.40	.011
Item 9 on Factor 1	5.35	.021
Item 14 on Factor 1	44.76	.000
Second-order Factor Loadings		
Factor 1 on Factor 4	32.46	.000
Factor 2 on Factor 4	7.02	.008
Error Covariances		
Items 18 and 19	8.82	.003

Figure Captions

Figure 1. Hypothesized Model of Factorial Structure of the Beck Depression Inventory Based on a Study of Three Samples of Swedish Adolescents (Byrne & Baron, Larsson, & Melin, 1994).


DEPRESSION
NEGATIVE ATTITUDE
DIFFICULTY PERFORMANCE
SOMATIC ELEMENTS
1 SADNESS
2 PESSIMISM
3 FAILURE
5 GUILT
6 PUNISHMENT
7 SELF-DISLIKE
8 SELF-ACCUSATION
9 SUICIDAL
10 CRYING
14 SELF-IMAGE
4 DISSATISFACTION
11 IRRITABILITY
12 WITHDRAWAL
13 INDECISIVENESS
15 WORK INHIBITION
17 FATIGUE
20 HYPOCHONDRIA
16 INSOMNIA
18 APPETITE LOSS
19 WEIGHT LOSS
21 BOY/GIRL INTEREST